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Enterprise Architecture Maturity: A Crucial Link in Business and IT Alignment

Edward Robertson
The University of Auckland, edward.robertson@francishealth.co.nz

Gabrielle Peko
The University of Auckland, g.peko@auckland.ac.nz

David Sundaram
The University of Auckland, d.sundaram@auckland.ac.nz

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Completed Research Paper

Edward Robertson
Francis Health
Wellington, New Zealand
edward.robertson@francishealth.co.nz

Gabrielle Peko
University of Auckland
Auckland, New Zealand
g.peko@auckland.ac.nz

David Sundaram
University of Auckland
Auckland, New Zealand
d.sundaram@auckland.ac.nz

Abstract

Misalignment between the business and IT function is an inhibitor in the achievement of competitive advantage. Enterprise Architecture (EA) promises organizational benefits including a closer alignment between IT and business. There is some argument about the true value that EA can provide. Some organizations credit their EA with creating significant value while other EA programmes fail. In response to this we explore whether EA fulfil their purpose in reducing the gap between IT and business. We conducted a case study of five companies that had EA functions. While we found that EA does not make alignment between IT and business more difficult, we did identify that many businesses do not achieve the purported benefits of EA because of poorly executed EA. We propose a four-stage maturity model for EA that encompasses the characteristics of EA, the 'soft skills' needed, and the business benefits available at each stage of maturity.

Keywords: enterprise architecture maturity, business, IT, alignment, enterprise architect

Introduction

A well-known phenomenon in business research is the 'gap' that exists within an organization between the IT department and the business. Silvius, de Waal and Smit (2009) define business and IT alignment (BITa) as "the degree to which IT applications, infrastructure and organization enable and support the business strategy and processes". This gap between business and IT is characterized by management's disappointment with the value they receive from IT investment. The reasons for this gap include cultural differences, organizational structure, experience and knowledge, and issues relating to information and communication interactions (Ward and Peppard 1996). Despite this, IT is seen as an important vehicle for performance improvement in organizations. To fully leverage the potential of IT within an organization, Enterprise Architecture (EA) is presented as an approach to increase alignment between business and IT (Dang and Pekkola 2017). The way that EA supports alignment is through its ability to manage business priorities, process, and strategy with the specific requirements associated with technical aspects of IT infrastructure (Espinosa Boh and DeLone 2011). Gartner (2009) defines EA as "the process of translating business vision and strategy into effective enterprise transformation by creating, communicating, and improving the key principles and models that describe the enterprise's future state and enable its evolution". EA is a tool to holistically analyze business, data and IS/IT within

a business to develop current and future state visualizations (Ross, Weill and Robertson 2006). Organizations adopt EA frameworks to establish grounding principles in which IT and related information systems decisions can be made. A robust and comprehensive EA allows businesses to remain efficient, competitive and innovative, within their respective marketplaces.

BITa has been unfailingly regarded as a key concern of business and IT executives for some years (Chen 2010). Alignment between IS/IT and the business allows an organization to apply information resources and utilize infrastructure to support important business processes and operations (Schlosser 2012). Alignment can lead to a more concentrated and strategic use of IS/IT assets (Chan and Reich 2007), which in turn allows an organization to create and maintain competitive advantage (Smith and Fingar 2003). While EA promises businesses numerous benefits including better alignment, cost savings, risk reduction, and improved decision making (Buchanan and Soley 2002) a large number of EA implementation projects fail (Roeleven 2010). This study aims to identify the role that EA plays in addressing the gap that exists in industry between business and IT.

The EA research domain is largely mature (Bernard 2012). However, much of the emphasis in the literature is placed on EA tools and frameworks (Leist and Zellner 2006). As previously discussed, the alignment between IS/IT and the business is crucial if businesses are to use their IT infrastructure to create and maintain a competitive advantage. EA is proposed as a discipline that supports the alignment between business and IT among other benefits. Yet, organizations report mixed results as to the benefits achieved. Thus, the objective of this research is to explore the proposition, does EA fulfil its purpose in reducing the 'gap' between IT and business? To answer this question, a literature review is presented, followed by a five participant case study. The purpose of the literature review is to ascertain a comprehensive understanding of the EA topic and its impact on BITa. The case study will then be employed to (a) validate the business case for EA, (b) identify inhibitors that limit the ability to achieve BITa through EA and; (c) propose a new model that synthesizes the levels of EA maturity.

Enterprise Architecture

As a research discipline, EA has been a field of importance for academics and practitioners since it was first introduced as a framework for better alignment between IT and business by Zachman (1987). Initially Zachman's framework focused on a technical level of IS/IT integration, although over time this has been adapted to include other elements including people, business strategy and process (Gregor, Hart and Martin 2007). Now, EA is a burgeoning research domain that has a significant impact on business (Niemi 2006).

Defining Enterprise Architecture

EA falls under the larger organizational domain of Architecture (Buchanan and Soley 2002) where Architecture is "the fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principle is guiding its design and evolution" (IEEE Computer Society, 2000). When Architecture is at the organization-wide level, it is referred to as EA (Jonkers, et al., 2006).

Many different definitions of EA exist within the literature. Gartner (2008) defines EA as "the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key requirements, principles and models that describe the enterprise's future state and enable its evolution". Jonkers et al. (2006) describe EA as structure and governance with a vision. Simon et al. (2013) say that EA works as a cohesive and aligned assembly of plans for the integrated representation of the business and it is IT infrastructure. West, Bittner and Glenn (2002) suggest that EA forms "the blueprint that documents all the information systems within the enterprise, their relationships, and how they interact to fulfil the enterprise's mission".

Whatever the definition, EA is presented as a tool to better align an organization's business and IT practices because of its ability to provide a clear set of principles, approaches and tools used in the formation of structure, processes and IS, and IT infrastructure (Ross et al. 2006). EA provides the framework so that stakeholders can communicate and make decisions about IT investments and the

impact on strategy from a shared perspective (Armour, Kaisler and Liu 1999). By conceptually articulating the business and IT environment, EA allows for efficient use of IT investments to support business strategy (Jonkers, et al. 2006).

Enterprise Architecture Frameworks

EA takes a model-based approach to the enterprise (Lindstrom et al. 2006) and supports the interrelationships between people, process, data, and technology (Winter and Fischer 2006). There are numerous EA frameworks available to organizations (Greefhorst, Koning, and van Vliet 2006). Some of the more common ones are Zachman Framework (Zachman 1987), TOGAF (Leist and Zellner 2006), Gartner Framework (Lapkin 2005), and Department of Defense Architectural Framework (Urbaczewski and Mrdalj 2006).

Armour et al (1999) propose that enterprise IT architecture (EITA) frameworks start with an encapsulation of a business' vision, mission, corporate, and IT strategy. This is communicated via two perspectives, organizational, (business, work, infrastructure, information, and function views) and technical aspects (architecture principles, standards profile, and technical reference model). All EA frameworks create abstract representations of the enterprise and its IT systems to a foundation for analysis, strategy, transformation, and shared communication (Lindstrom et al. 2006). While each variation of the EA framework takes a slightly different perspective and highlights differing components, Greefhorst et al. (2006) suggests that EA frameworks are not mutually exclusive. In general, they are designed as a matrix that cover eight dimensions: type of information, scope, high-level view, meta-level view, stakeholders, current and future state(s), quality elements, and representation.

Business Value of Enterprise Architecture

In a large synthesis of the EA literature Niemi (2006) concluded that EA benefits fell largely into four groups; indirect, hard benefits, strategic, and intangible. Further, Espinosa et al. (2011) have suggested that the benefits of EA fall into several categories: technical benefits and business process benefits, which when combined create organizational benefits. Adopting an EA approach can bring about technical benefits for organizations. The use of data is increasingly becoming a strategic priority of business (Bryd and Turner 2001) and EA is credited with reduced data redundancy and improved data integration (Espinosa et al. 2011). When implementing an EA, businesses develop data models that detail the governance of organizational data and this leads to better utilization and reduced cost as the development costs of new applications is lowered due to a consistent foundational data model (Bryd and Turner 2001). An enterprise-wide common data model also ensures greater agility as businesses can easily utilize their data and react to competitive forces (Espinosa et al. 2011). An EA also supports businesses to make effective IT purchasing decisions based on the strategy and needs of the enterprise (Ross et al. 2006).

Espinosa et al. (2011) identify five business process level benefits of an EA approach. Firstly, an EA provides a solid foundation to support automation that results in increased efficiencies (decreased redundancies) and cost savings. The common data model and integrated application architecture that EA supports allow for easier integration of new processes and workflow (Niemi 2006). An EA provides support for increased modularity, allowing organizations to design loosely coupled business processes to support quicker responses to competitive threats - allowing for more agile and adaptive organizations (Ross et al. 2006).

Espinosa et al. (2011) identify five organizational benefits that result from the attainment of technical and process benefits. As businesses adopt EA programmes, they profoundly revolutionize the way they operate (Ross et al. 2006). Successful EA programmes result in increased productivity (Wan et al. 2013), more adaptive enterprises (Hoogervorst, 2004), lower process lead times, revenue growth (Espinosa, Boh, and DeLone 2011), and significant cost savings (Armour et al. 1999). It is the achievement of organizational level benefits that result in better alignment between IT and business.

In contrast to Espinosa et al. (2011), Tamm et al. (2011) found that while many authors discuss the potential benefits of EA, there is very little empirical evidence that adoption of EA leads to business benefits. In their exploratory research Tamm et al. develop an EA benefits model to describe the value that EA offers. Tamm argues that four benefits enablers, organizational alignment, information availability, resource portfolio optimisation and resource complementarity, mediate the achievement of organizational benefits from EA adoption.

Enterprise Architecture Maturity

There are a select number of maturity frameworks that have been developed within the EA research domain (Vallerand et al. 2017). Although not domain specific to EA, Ross (2003) has developed an architectural maturity model that identifies four stages that a firm goes through after implementing an architectural framework. The first stage, application silo is where organizations focus IT development on creating solutions for individual business problems, this leads to disjointed architecture in various places of an organization (Ross et al. 2006). The second stage standardized technology is reached when some of the siloed architecture are shared across a small number of departments within an organization. The key shift in the maturity model is where IT strategy starts to focus on cost efficiencies and reliability of systems (Ross, 2003). Once in the third stage, optimized core, businesses start to develop an enterprise-wide architecture where processes and data are standardized. Finally, in business modularity, architecture enables strategic advantages to the organization (Ross et al. 2006). The advantages are gained through an architecture that supports loosely coupled processes underpinned by data and technology governed by EA.

Although Ross' framework is labelled a maturity framework, in reality it is more of a hybrid roadmap that details the milestones in EA implementation. In contrast, the United States Government Accountability Office (GAO) has developed a model that can be used to assess the maturity of an EA framework (GAO, 2010). In comparison to Ross' maturity model, the GAO framework is at a much more detailed and tactical level. The GAO framework details five stages of EA maturity. Stage one: creating EA awareness to stage five: leveraging the EA to manage change. At stage one an organization has some consciousness of EA but no plans to implement the programme. At stage two, the foundation is laid – the architecture team is formed and a framework is chosen by the organization. Stage three is where the EA programme starts (Kaisler et al. 2005) and the 'current state' is documented by the EA team. At stage four, the current state has been completed and the resulting EA documentation and governance is then used to make IT decisions to support the organization to reach stage five, the highest maturity level. At stage five, EA enables change to support business strategy through the alignment of IT (GAO, 2010). These two frameworks focus on the technical implementation of EA. In the case of both maturity models (Ross 2003, GAO 2010), neither framework considers the impact that Enterprise Architects (and their skills) have on the achievement of levels of maturity.

The Enterprise Architect

The Enterprise Architect is the individual within an organization who is responsible for managing the EA programme and plays a crucial role in the successfulness of EA (Chuang and van Loggerenberg 2010). As the role of the Enterprise Architect is such an integral component to the functioning of an EA, it is somewhat surprising that the role of the Architect has largely been unaddressed by the literature. While there have been no studies that are solely focused on Architects, the skills required by EA practitioners has been touched upon in some research.

Kaisler et al. (2005) state that Enterprise Architects must be well versed in the technical knowledge, and they must also hold strong project and change management skills to be able to lead an effective EA programme. An Enterprise Architect must possess three crucial attributes: emotional capacity and communication skills, technical IT skills, and conceptual skills (Armour et al. 1999). Architects need to be able to develop a technically coherent and comprehensive visualization of the current state then conceptualize what the future state should look like. The Architect must have a sound understanding of the business in which they operate and how they can structure IT to support the needs of the organization

(Henderson and Venkatraman 1993). The Architect then needs to be able to discuss with management and communicate this vision to stakeholders (Armour et al. 1999).

While not specifically talked about in EA research, the idea of soft skills needed by IT professionals has been covered in research other IT disciplines. Like Henderson and Venkatraman, Noll and Wilkins (2002) identify that as well as needing domain specific technical skills, IT professionals must also possess knowledge and understanding of business. Noll and Wilkins also identify a need for collaborative team skills, leadership, organization, and effective communication skills for formal and informal situations.

In a study on Enterprise Architects in South Africa, Chuang et al. (2010) found that many EA issues that are encountered are because of a lack of non-technical skills held by Architects. In their interviews with participants, Chuang et al. (2010) found that the single biggest challenge is communication, this was because Architects, because of their background predominantly in IT, were trained to talk 'technically' and did not possess the skills required to communicate with non-technical individuals from the business-side. This relates closely related to the findings of van der Raddt and van Vliet (2008) who identified a fragmented picture EA exists in practice. Van der Raddt et al. (2008) find that to build a successful EA practice, one must go beyond delivery of the EA project and also include stakeholders, structures, and process that is related to EA decision-making and governance. Van der Raddt et al. (2008) describe a model that seeks to mature the EA function, yet they do not discuss the how the role of the Enterprise Architect needs to adapt to deliver on the new model.

Closing The Gap Between Business And IT

One of the core promises of EA is its ability to align better business and IT (Armour et al. 1999). However, EA programmes do not always result in the achievement of high-level expected benefits (Hoogervorst 2004) that related to better alignment. Espinosa et al. (2011) found that while having an effective EA programme is an attractive possibility – the coordination and implementation efforts that are needed to establish the EA can be daunting and counterproductive. Kamogawa and Okada (2008) state that successful EA implementation is contingent on EA governance, management, and cognition. Similarly, Espinosa et al. (2011) find that governance and EA maturity are seen as mediating factors in the attainment of business benefits derived from EA. In their study on the human factors in EA implementation failure Mezzanotte and Dehlinge (2012) identify six key reasons why EA projects fail ranging from poor: communication, project management, change management, leadership, and top management support to a lack of technical and business knowledge. While, Gartner (2009b) identifies five similar EA pitfalls.

The academic literature is full of examples of the potential value that EA can generate for business (Armour et al. 1999, Jonkers et al. 2006, Ross et al. 2006, Espinosa et al. 2011). Yet, not all organizations achieve business benefits from their EA programmes. An ARIS expert paper (2009) states that 66% of EA projects fail. The question remains, does EA fulfil its purpose in reducing the gap between IT and business? While the EA research domain is largely matured (Bernard 2012), much of the focus of academics has been on the EA tools, frameworks, and roadmaps to support EA implementation. There is little higher level frameworks or concepts that guide an organization to a level of EA maturity that would enable a reduction in the gap between IT and business. Further, the literature is somewhat lacking with regards to the Enterprise Architect considering the importance that they play in the success of the EA programme.

Research Method

To address the issues identified in the previous sections and provide a response to the research objective does EA fulfil its purpose in reducing the 'gap' between IT and business, we conduct an exploratory case study on five organizations. In conducting this research, we followed a three-stage iterative research framework. In the exploratory phase of our research, we spoke with two Enterprise Architects about the challenges they were experiencing in their organization. These conversations lead to the forming of the research objective. Following this, we completed a literature review encompassing the various perspectives of BITa and EA. The output of our observation stage provided the foundation for

our theory building. The theory we developed was grounded in the literature while also influenced by our conversations with industry practitioners. This theory building led to the development of two new concepts: poorly executed EA and a maturity model for EA. To strengthen our theory, we conducted five interviews with Enterprise Architects from organizations in different industries were selected. The case studies were also selected concerning their level of maturity to ensure that a wide range of experiences was captured. The use of five case studies allows for stronger generalization of findings and the ability to gain more insights that otherwise may not be possible (Yin 1994). Interviews were chosen as the sole data collection technique. One semi-structured interview, was held with each of the five participants. The average interview lasted between 35 – 45 minutes and all were recorded by the researchers. At each interview, a question schedule was used although the interviews were held in a casual discussion manner and the discussion often deviated from this. Questions on the question schedule included "can you describe what EA looks like in your firm?" and "what tangible benefits have you gained from Enterprise Architecture?". Semi-structured interviews were used to ensure that answers to necessary questions were gained but that the data collected was not constrained (Myers 2013). Our interviews were held over the period of one month. Following each interview, we made adjustments to our theory and also added to our literature review if the interviews identified new themes that we had not covered. Following the recording, the interviews were transcribed and then sent back to the participants for final acceptance. Only one participant requested changes to be made – this related to the anonymizing of some names in the transcript. Following final clarification from the participants that they approved of the transcripts the qualitative data was analyzed. We employed coding as the data analysis technique in this research, where the qualitative data was analyzed according to themes that emerged. Through several iterations of coding we ended up with four key themes that emerged from the data. This data then formed the basis for the following discussion.

Discussion

The following section contains the results of the data collected as well as a discussion synthesising the results from the interviews with insights from the literature review. We build a justification for the formulating of new theory and an artefact. We propose that organizations do not achieve high-level benefits because of poorly executed EA. With this in mind we propose a new maturity model for EA. EA is purported to provide significant value to the organization, and this value has been categorised as technical benefits, business process benefits, and organizational benefits (Espinosa et al,. 2011).

Technical Benefits

All of the participants were easily able to identify the technical benefits that their organizations had generated. At Healthcare Co, the Enterprise Architect singled out cost savings that were going to be achieved via a centralized data management model and support that the EA would give in later years when Healthcare Co would be developing and buying new architectural tools. EA was enforcing governance on architects within Forest Products Co to ensure that new projects as they were developed conformed to pre- existing rules. The Enterprise Architect at Payments Co said that people knew what would be expected of them as the EA framework provided "what the edges of the sandpit look like". The EA programme ensured that any IT decisions made are not disparate to organizational strategy. For Financial Services Co, their EA programme reduced the amount effort regarding IT purchasing as people had a clear idea of what the target state of the organization was and could make decisions in line with this. The EA consultant at Funding Services Co identified the motive for implementation of their business was "to try and cut the costs and try and deliver only what's needed as quickly as possible with as little disruption as possible".

Business Process and Organizational Benefits

While the participants could identify technical benefits, it was much more difficult for them to identify tangible higher-level benefits of EA. Although technical benefits are desirable to IT stakeholders, it is the matching of the achievement of business process and organizational level benefits that result in a better alignment between business and IT. Payments Co recognized that the EA framework did ensure that there was some alignment between IT decisions and the organizational strategy. For Healthcare Co,

their EA supported the move to mobile business processes for their workforce through modular business process change. The Enterprise Architect at Financial Services Co identified business process and organizational level value delivered by EA. Their EA programme allowed them to be "able to see some of the big disruption that is taking place, acknowledge the principles of understanding that and then come back with target states that say that's where we're trying to head". This gave Financial Services Co the foundation to be able to adapt business processes much faster than their competition, resulting in a larger market share and a corresponding increase in revenue. *"As an organization, we've gone from strength to strength. A lot of the underpinning of how we've been able to do that has been architectural."* Head Architect - Financial Services Co.

Reasons for inability to exploit higher-level Benefits

Authors criticize EA for failing to deliver all of the business benefits that are claimed (Tamm et al. 2011). One interesting insight from the study was the idea that the achievement of better alignment between the business and IT via EA is moderated to the level at which business management supports the EA function. This is not surprising as the idea that top management support is required for successful EA is well established (Luftman et al. 1999); Mezzanotte and Dehlinger 2012; Gartner 2009). Financial Services Co was the organization in this study who achieved the highest level of benefit. They stated that there was complete top-down support for the EA programme, from the board and CEO to the CIO and down to the Head Architect, who sat in the general management level. The other Enterprise Architects reported inconsistent support from business management. At Healthcare Co, the decision to start an EA programme was made by the CEO who believed in the value but *"it was a mixed bag as to whether there was buy-in. There was buy-in at certain levels, I would have to say I do not think it was consistent".*

Role of EA in Business And IT Alignment

Better business and IT alignment is a significant goal for many organizations (Bryd and Turner 2001) and EA is promoted as a way in which this can be achieved. EA is a moderately matured research discipline (Gregor et al. 2007) where the literature is full of examples of tools and methodologies that can be implemented (Leist and Zellner 2006). Although the literature is well understood, many businesses still fail to achieve successful EA programmes that results in the gap between their business and IT functions not being reduced. This study proposed to answer the research objective: does EA fulfil its purpose to reduce the 'gap' between IT and business? In all of the interviews with participants the simple answer is, yes, EA can decrease the gap between IT and business but often EA is not being implemented in a way that does achieve better alignment. If EA is implemented as a way of reducing the gap between IT and business and it does not then there is a significant missed opportunity. *"I don't think EA makes the gap worse. But I think it's more of one of lost opportunity. I know one organization, and I'm not sure that organization is interested in EA anymore. Because you've got to get these tangible benefits from EA...show me the value!"* Enterprise Architect – Healthcare Co. The missed opportunity is highlighted when comparing the levels of BITa in each of the participants in this research. At Financial Services Co, the Head Architect was adamant that there is almost complete alignment between business and IT within their organization. The organization believes it is ahead of their competition in its use of IT both internally and also in its ability to deliver value to customers. This was shown by a recent ground-breaking product that had technical, application, information, and security architectural implications. EA at Financial Services was able to support the organization to deliver this "ground-breaking" product to the market at a great pace.

Poorly Executed Enterprise Architecture

How can one organization have such great success with their EA programme whereas others have difficulty in using EA to create better alignment? The blame for EA not helping in reducing the gap between IT and business could lie with what this research terms as poorly executed EA (PEEA). PEEA is a situation where an EA programme exists but it is executed without complete structure and accountability. Three common themes emerged from the research that combine in some proportion to create PEEA; these are shown below. These themes are distinct from other inhibitors or reasons IT

failure that other scholars (Luftman et al. 1999) have described are specific to the EA domain. The first is a *lack of clearly defined deliverables* which is where the EA function does not have a clearly articulated assignment given to them (or created by themselves) on which they have to deliver. As the Enterprise Architect from Healthcare Co said this results in an undisciplined organizational unit that exists but has no clear value proposition. This eventually leads to an underachievement of value from the EA programme. Where there is a lack of defined deliverables and business executives who do not give full support to the EA function the result can be a *lack of responsibility and accountability*. The Enterprise Architect at Payments Co compared his current position with a previous position and said that increased responsibility came with more organization clout. If Enterprise Architects do not have deadlines to meet and management is apathetic to EA, then what results is a lack of responsibility of the Architect to deliver. This creates a lack of visibility within the EA domain and does not lead to higher-level value within the organization. Finally a *lack of 'soft skills'* that Enterprise Architects hold is a notable theme of PEEA. To manage the EA programme, Architects must have a wide array of skills that include, stakeholder management, verbal communication, 'sociability' and leadership.

Necessary Skills of Enterprise Architects

The Architect is an integral part of the successful delivery of the EA programme as they are the individual(s) who execute the programme, design visualizations, and develop and communicate the principles. A surprisingly common theme that emerged throughout the research was that Enterprise Architects lacked the soft skills necessary to drive this organizational change. As a research discipline, EA is largely matured, although there is a comparatively smaller amount of research that focuses on Enterprise Architects. To achieve high-level benefits, Enterprise Architects must be able to show leadership and get traction with management. This research proposes that one reason EA programmes do not result in better BITa is because the Architects that are charged with delivering the programme do not have the 'soft skills' necessary to push for higher-level business benefits. Many authors have expressed the need for Architects to have an understanding of the business environment that they sit within (Henderson and Venkatraman 1993; (Armour et al. 1999; Kaisler et al. 2005) as well as communication and generic business skills (Noll and Wilkins 2002). However, the findings from this case study indicate that a much deeper level of business skill is needed by Architects to drive a successful EA programme. *"One thing to say about EA to realise that it's not a very easy field. You need people who have a wide spectrum of experience. Particularly in the corporate level or business level. But they also need to have some strong technical skill which of course only gets more difficult as technology increases and the skills that they need to have becomes much wider of course as well... That's the problem, the breadth of skillsets that you need."* Enterprise Architect – Funding Services Co. It was largely agreed by all the participants that EA is in itself not an easy field as a wide range of skills is necessary. In all of the case studies, the Architects that we interviewed entered Architectural roles as their careers are changed and developed. In all cases, they first worked in technical fields, and soft skills tended to be ignored, relying on the individuals own strengths. One area that participants highlighted was that Architects tend to be weak in communication with non-technical stakeholders. The reasoning is that to drive organizational change and encourage better BITa, even the most advanced EA programme could not be delivered if the Architect(s) in charge of the programme did not have the social capital within their organization and the communication and leadership skills to drive the change. *"We put quite an emphasis on communication skills; getting to know people, getting to connect in with them and that meant understanding the business. Moreover, when I say the business, every factor of the business, so in doing that there was much changing our engagement and using metaphors, analogies. So very approachable language, using humour, building networks, going for coffee. Trying to connect with people from all over the organization.... people started to see the architects as approachable, connectable, 'these are people whom I can connect with and they can understand what I'm trying to do."* Head Architect – Financial Services Co.

The following is a synthesize from the interviews of the key 'soft skills' that Enterprise Architects need, although not all mutually exclusive they are all essential:

Networking skills: Networking skills are vital to ensure that Architects can build social capital with the 'movers and shakers' and the individuals who hold the social power within their organization. This

makes the road to management recognition and support for the EA function easier, as well as to open up more opportunities for the EA programme to collaborate with other organizational departments rather than be siloed.

Interpersonal skills: Architects need to be approachable and connectable to work enterprise-wide and to fuse the worlds of business and technology. Strong interpersonal skills, especially verbal and written communication is desirable to communicate EA principles and visualizations to other stakeholders. Strong interpersonal skills allow Architects to build social capital.

Stakeholder management: The Enterprise Architect at Funding Services Co identified that one EA project they delivered failed due to poor stakeholder management. Stakeholder management is necessary for all projects but particularly in EA. Architects need to understand their stakeholders' motivations, investment, opinions and influences. Successful stakeholder management results in more probable successful outcomes.

Leadership Skills: Architects need strong leadership skills to drive organizational change through the EA function. They need to be able to encourage and motivate a wide range of people to buy into their future state plans. They also need the project management skills to drive the programme from 'on paper' (theory) to one of deliverance (practical outcomes).

We note that our findings relate to Luftman et al. (1999) who also found that IT leadership was an enabler of closer BITa. This study holds true the findings of Chuang and van Loggerenberg (2010) who found that that many EA issues that are encountered are because of a lack of non-technical skills held by Architects, although it builds on their findings by identifying four key 'soft skills' that Architects need: networking, interpersonal, stakeholder management, and leadership skills.

Proposed Maturity Model For Effective Enterprise Architecture

The implementation of PEEA is leading some organizations down a path where they are investing significant resources into an EA programme that is not resulting in better alignment between their business and IT functions. This research study identifies that this is because the Enterprise Architect(s) that are charged with running the programme does not always possess the 'soft skills' necessary to exploit fully the opportunities that EA could provide to their organizations. Authors have previously developed models that detail the levels of maturity of the EA. Most models relate to the wider Architecture domain (Ross 2003) or specifically to the EA organizational unit (GAO 2010) and do not include skills or traits of the Enterprise Architects. We propose a maturity model (Figure 1) for the EA discipline that gives credence to the important of the skills of architects to the success of EA.

Within the model, there are four stages of maturity. Each stage is accompanied by a description of what EA 'looks like', the necessary skills that Architects need, and the business benefits that can be achieved. This model is intended to be more conceptual than Ross (2003) and it is anticipated that it be associated with a more traditional maturity model than roadmap like GAO (2010). The proposed maturity model builds on elements from Ross (2003) and GAO (2010). In addition to this the skills of architects are synthesized from the interviews with Enterprise Architects as well as from existing literature (Noll and Wilkins 2002, Kaisler et al. 2005). Finally, the available benefits at each stage have been sourced from data from the interviews and supported by Espinosa et al. (2011) depiction of EA benefits.

Stage One

Stage one is the lowest level of maturity. At this level integration between the EA function and other organizational units is when absolutely necessary. Top (business) management tend to be apathetic towards the EA programme and do not completely understand its purpose. EA is at this stage at a very early development level and lacks direction and strategy. The Enterprise Architect may well have strong technical skills but they are not fluent in the key soft skills that are necessary. The Architect is also not fluent in stakeholder management, leadership, and networking skills. They may have good interpersonal skills with IT stakeholders but a lack of other the soft skills means they are constrained. Most of the benefits achieved at stage one are related to technical benefits. These may include cost savings, redundancy and integration benefits related to data management and application development.

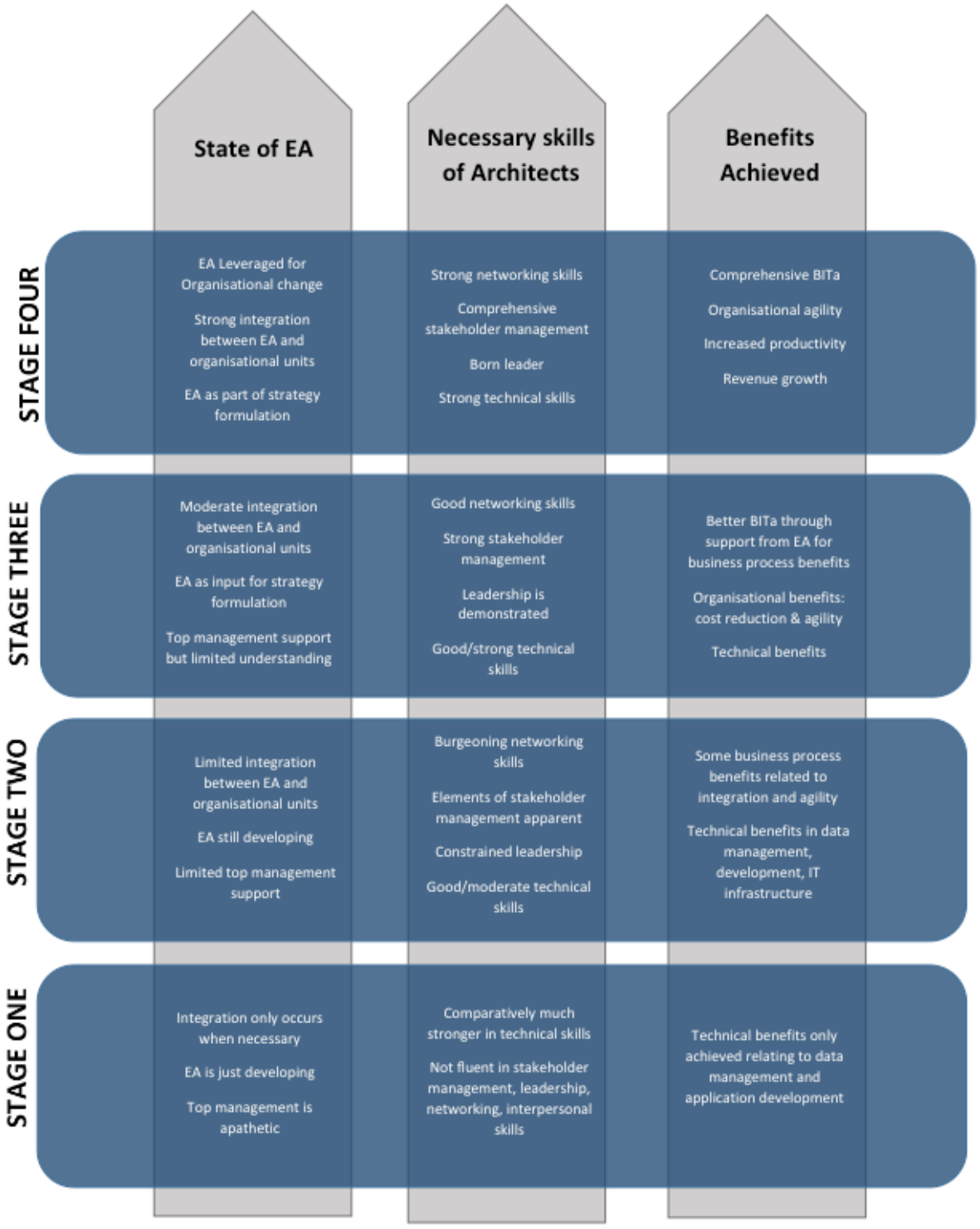

Figure 1: Proposed maturity levels of EA

Stage Two

At stage two there is some limited integration between the EA function and other organizational units. Integration usually occurs with closely related departments and this often results in siloed pockets of improvement. At this stage, the EA function will have limited top management support although there might be stronger support with their direct report who sits in the executive management layer. Architects in control of an EA at stage two may have some form of stakeholder management occurring. The Architect will still be considerably stronger in technical than soft skills. They may show some leadership qualities but these are constrained because of limited social capital and organizational impact due to limited top management support and weak networking skills. Organizations at stage two may realise

technical benefits: cost savings, reduced redundancy, better integration, and increased flexibility. Because of some collaboration with other organizational units, some business-level benefits relating to the integration of IS/IT and faster execution of process may be realised. In our research, Forest Products Co and Funding Services Co are the two organizations most likely to be at stage two.

Stage Three

At stage three there is moderate integration between the EA function and other organizational units. Perspectives and insights from the EA function may also be an input for strategy formulation at the IT level and potentially for corporate strategy. At stage three there is wide-ranging top-management support although stakeholders tend to lack a comprehensive understanding of what the EA function does. Enterprise Architects at stage three hold both sound technical and 'soft' skills. The architect has good networking skills that they use to develop social capital with various IT and business stakeholders. Stakeholder management principles are applied during EA activities and these are largely successful because of the strong written and verbal communication ability of the architect. Elements of strong leadership are shown by the Architect at stage three. At stage three the organization is starting to reap rewards that result in better BITa. As well as numerous technical benefits, the EA programme results in significant business process level benefits. These benefits may include support for modular and agile process change. Importantly, there will be increased alignment between business process and the IS/IT infrastructure that will help in the achievement of strategy and competitive advantage. At stage three, the organization will start to see consistent organizational benefits relating to reduced cost, increased flexibility and agility, and reduced product lead time. In our research, Payments Co and Healthcare Co are the organizations most likely to be at stage three.

Stage Four

Stage four is the highest level of maturity. This is where EA is an effective lever to drive organizational change and there is comprehensive integration between the EA function and other organizational units – there may even be partnerships developing. At stage four, the EA function has strong top management support and is likely to be involved in the formulation of corporate strategizing. The Architect at this level has a balanced but deep aptitude for technical and soft skills. The Architect has strong networking skills that support their ability to facilitate comprehensive stakeholder management across all projects and stakeholders. Naturally, the Architect has strong written and oral communication and they are a 'natural born leader'. At stage four, the EA programme delivers almost complete BITa. Technical and business process level benefits result in wide organization benefits. These may include increased agility and organizational responsiveness, and revenue growth. In our research, Financial Services Co is the organization most likely to be at stage four.

Conclusion

In theory, businesses in the pursuit of improved organizational performance adopt EA programmes to achieve better alignment between their business processes and IT/IS infrastructure. Yet, many organizations are not achieving better BITa through EA and a number of programmes have failed or been stopped because of their inability to generate value. In this research we sought to answer the question: does EA fulfil its purpose of reducing the gap between IT and business? We found that EA can enable better BITa, however there is a significant lost opportunity as many organizations are implementing poorly executed EA that results in a lack of business benefits. Results from our study show that there is some evidence to suggest that an EA does help in achieving improvement for business, yet this is not at a level at which previous authors have suggested. The results from this study found that EA does result in the achievement of technical benefits within the IT function. However, benefits at the business process and organizational level are much harder to achieve. EA is proposed as a tool that supports the alignment between business and the IT department within an organization, yet a closer alignment between these two groups can only happen through when business process and organizational level benefits are achieved. Two of the five participants in this study had achieved higher-level benefits. Evidence from these two case studies suggests that the level to which the EA programme is supported by top management moderates the achievement of higher-level benefits and this is supported by the literature. Further, this study proposes that the reason many organizations cannot

fully realise all the benefits that EA offers is because of poorly executed EA (PEEA). PEEA is characterized by an EA discipline that suffers from a lack of defined deliverables, responsibility and accountability, and more crucially that Enterprise Architects lack the 'soft skills' needed to drive high performing EA programmes. Building on existing literature, we have identified that four key 'soft skills' need to be held by Enterprise Architects, for organizations to achieve high-level benefits that include closer BITa. These four skills are networking, interpersonal, stakeholder management, and leadership skills. We propose that the 'soft skill' ability of the Enterprise Architect is one of the most critical mediators in the achievement of high-level benefit from EA. Finally, we suggest a four-stage maturity model that includes the skills that Enterprise Architects must possess, as well as the characteristics of the EA programme and business benefits that are available at each level of maturity.

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